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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/451,979	11/30/1999	KATSUMI SAMESHIMA	362-39	9727

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BODNER & O'ROURKE, LLP
425 BROADHOLLOW ROAD, SUITE 108
MELVILLE, NY 11747

EXAMINER

LOUIE, WAI SING

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/451,979

Applicant(s)

SAMESHIMA, KATSUMI

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi (US 5,708,284) in view of Knight et al. (US 4,737,422).

With regard to claim 1, Onishi discloses a non-volatile random access memory (col. 5, line 30 to col. 11, line 7 and fig. 6) comprising:

- An insulation film 7 having a concave portion at a top surface;
- A film 8a formed in a bottom of the hollow and separating between the insulating film 7 and the lower electrode layer 8b (fig. 6);
- A laminated body obtained by laminating a plurality of layers on the top surface and etching a region of the plurality of layers corresponding to a region other than the concave portion, where the laminated body includes a lower electrode 8 which is brought into contact with a bottom surface of the concave portion, a ferroelectric layer 9 formed on the lower electrode 8 and an upper electrode layer 10 formed on the ferroelectric layer 9, where a portion of the lower electrode layer 8 protrude outward from an inner peripheral edge forming the concave portion, and a side of the portion of the lower electrode layer 8, a side of the

ferroelectric layer 9 and a side of the upper electrode layer 10 are flush with each other (fig. 6). Onishi does not disclose the lower electrode layer is made of a gel dry film. However, Knight et al. disclose forming the lower electrode by vacuum drying a gel solution (Knight col. 14, lines 57-68). Knight et al. teach the gel method could control the physical form and the degree of polymerization of the electrode (Knight col. 15, lines 13-15). Therefore, it would have been obvious at the time the invention was made to modify Onishi's device with the teaching of Knight et al. to use the gel method to form the lower electrode in order to control the physical form and the degree of polymerization.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi (US 5,708,284) modified by Knight et al. (US 4,737,422) as applied to claim 1 above, and further in view of Roberts et al. (US 5,861,344).

With regard to claim 3, in addition to the limitations disclosed in claim 1 above, Onishi also discloses:

- The lower electrode layer includes a first electrode portion 8a and a second portion 8b formed on the first electrode portion 8a, but Onishi does not disclose the first electrode portion 8a formed only at a corner of the hollow. However, Roberts et al. disclose forming an improved electrical contact by depositing the corner fill 32 in the hollow (Roberts col. 7, lines 19-30 and fig. 3 and 4). Roberts et al. teach the first electrode portion acts as seeding material and selective deposit at the corner (Roberts col. 2, lines 41-44) and improves metal contact in the

hollow (col. 7, lines 19-23). Therefore, it would have been obvious for the one with ordinary skill in the art to modify Onishi with the teaching of Roberts et al. to provide the corner fill in the hollow in order to establish the seeding material and improves metal contact in the hollow.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi (US 5,708,284) modified by Knight et al. (US 4,737,422) as applied to claim 1 above, and further in view of Zurcher et al. (US 6,344,413).

With regard to claim 4, Onishi does not disclose the lower electrode is formed on a surface of a thin film of the same material as that of the lower electrode. However, Zurcher et al. disclose a thin film of titanium may be deposited on top of the first conductive layer 208 (Zurcher col. 6, lines 28-43). Zurcher et al. teach the thin film serves as an adhesion layer (Zurcher col. 6, lines 28-43). Therefore, it would have been obvious for the one with ordinary skill in the art to modify Onishi with the teaching of Zurcher et al. to provide a thin film in the lower electrode in order to improve the adhesion to the lower electrode. The first conductive layer 208 is made of titanium, which is the same material as the thin film (Zurcher col. 6, lines 28-43).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi (US 5,708,284) modified by Knight et al. (US 4,737,422) as applied to claim 1 above, and further in view of Hanagasaki (US 5,767,541).

With regard to claim 5, Onishi does not disclose the top surfaces of lower electrode and the insulating film are planarized flush with each other. However, Hanagasaki discloses the lower electrode is planarized flush with the insulating film (Hanagasaki fig. 1E). Hanagasaki teaches planarization could remove surface irregularity (Hanagasaki col. 7, line 37). Therefore, it would have been obvious to one with ordinary skill in the art to modified Onishi's device with the teaching of Hanagasaki to planarize the top surface of lower electrode flush with the insulating film in order to remove the surface irregularity.

Response to Arguments

Applicant's arguments filed 4/25/03 have been fully considered:

- Applicant pointed out that the reference Onishi does not disclose the lower electrode is made by a gel method. However, Knight et al. teach forming the lower electrode by a vacuum drying gel method. Therefore, the lower electrode 8a of Onishi's device could be modified and formed by this method. The limitations of claim 1 are fully addressed.
- Applicant argues the thickness of lower electrode 8a and 8b are nearly equal; this would prolong etching time and exposure to the plasma (page 9 of remarks). However, the claimed invention is a non-volatile random access memory device and the thickness is not in the present claims. The prolonged etching time and exposure to the plasma are process limitations, which does not carry any patentable weight.

- Applicant pointed that reference Zurcher et al. do not disclose the claimed limitation in claim 4. A revision is made to show the right column and line number. Please see claim 4 above.
- Applicant argues that Hanagasaki planarizes the W plug and does not disclose planarizing the lower electrode. However, the W plug is part of the lower electrode that deposits into a hollow in an insulating layer. Therefore, Onishi in combination with Hanagasaki meets the limitations of claim 5.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

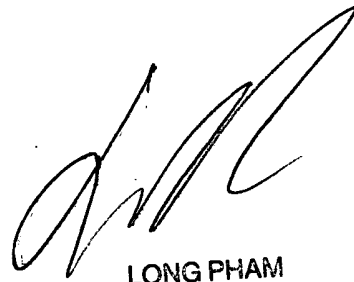
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474 before 1/15/04 and (571) 272-1709 after 1/15/2004. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1562.

Wsl
December 3, 2003.


LONG PHAM
PRIMARY EXAMINER